ICFO Colloquium Series: Visualizing Strongly Correlated Phases of Matter in Two-Dimensional Materials

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10:00 to 11:00
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ABSTRACT:
Understanding strongly interacting phases of matter continues to challenge our understanding of many particle quantum mechanics. The platforms in which such phases occur spans a wide range of materials, but in this talk I'll focus on those realized in two-dimensional materials. I will describe a few experiments, from those probing strongly interacting states realized in high-magnetic fields, such as direct visualization of a Wigner crystal to detection of fractional quantum Hall states with local spectroscopy. In zero field, twisting layers of 2D materials can be used to create flat bands that analogous to Landau levels can host novel interacting quantum states of their own, such a correlated and Chern insulators. These experiments show the power of spectroscopic imaging in providing us with invaluable tool to probe and understand complex electronic states starting with direct visualization.

BIO:
Ali Yazdani is known for his research in advancing our understanding of emergent quantum phenomena by application and development of high-resolution microscopy techniques to directly visualize highly entangled quantum states of matter. He started his own independent research group at the University of Illinois in Urbana-Champaign in 1997 before joining Princeton's physics department in 2005. Yazdani has held visiting professorships at different universities including at Cambridge University (UK) and has been a Loeb Lecturer at Harvard and an Einstein Lecturer at the Weissman Institute in Israel. For his research accomplishments, he has been recognized with several awards and honors including a Humboldt research award and has been elected a fellow of American Physical Society, American Association for Advancement of Science, American Academy of Arts and Sciences and National Academy of Sciences.

Hosted by: Prof. Dr. Carmen Rubio-Verdu